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ABSTRACT

An efficient market is where stock price has already indicated all available information. In addition, all asymmetric information could be turned into symmetrical phase. Efficient market adheres to Random Walk's principle, so that investors cannot use all information to make abnormal returns. This research examines if the Indonesian Capital Market follows the efficient market principle. The research uses ARMA (3,1)- TARCH (4,3) model and finds that the Indonesian Capital Market meets the assumption of Random Walk's Hypothesis (RWH), so that the Efficient Market Hypothesis (EMH) could be approved. The other finding of this research is that the available information in the Indonesian Capital Market is not symmetric. This could be approved from the value of Leverage Effect from ARMA (3,1)-TARCH (4,3) models is not equal to zero. However, the Leverage Effect is not significant, so that the investor could not make abnormal returns.

JEL Classification: D61; G14; R53.

Keywords: Random Walk Hypothesis; Efficient Market; TARCH.

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1. INTRODUCTION

The Indonesian Capital Market (BEI) as a part of the Emerging Market could be interesting for domestic and foreign investors to invest (Haryogo, 2013). The interesting one could be resulted by the finding of Cointegration and Causality Bapepam-LK team that the Indonesian capital market volatility is the highest compare to US and Europe capital market. The performance of the Indonesian Capital Market is showed by the movement of the Composite Stock Price Index (IHSG) which reflected stock price rate that is traded in the Indonesia Capital Market. (BEI). The development of IHSG is determined by many factors. This could be external such as intrerest rate, foreign exchange, or internal emitent such as profit, Earning per Share (EPS) and shared dividen. Hooker (2004) found that interest rate, inflation and foreign exchange have a significant influence on the volatile of stock prices with time lag between 1 and 3 months. Tripathy (2011) finds Asymmetric GARCH model is better in prediction the volatility of stock prices in the Indiannn Capital Market than Symmetric GARCH model with independent variables such as interest rate, foreign exchange, international capital market and trade volume. Tripathy (2011) found all variables, which has a significant effect on the price stock volatility.

Several other reseaches examine variables on price stock index such as interest rate, inflation, economic growth and other macro economics have been done by Avonti and Prawoto (2004), Shaeri et al. (2016), Gan et al., (2006), Kandir (2008), Heidari et al. (2013), Mun et al., (2008), Adaoglu & Katircioglu (2013), and Rahman et al., (2009). These researches are supported by Tripathy (2011), Rad (2011), Herve et al., (2011), Hsing (2011), Jeong and Kim (2011), Sirucek (2012), Hussin et al., (2012), Kewal (2012), Nofiatin (2013), and Triani (2013). The findings from several reseaches describe that over all macro economics variables statisticaly significant in determining the stock price index volatility, altough there are several variables which are not consistent among those reseachers. There is a Spillover Effect from one capital market to another country capital market. The finding is supported by Haryogo (2013). Based on these researches, an important question has not been answered, if all variables which are determined stock price in the capital market could be used as information to predict today stock price or not? This question could be answered with the concept of Efficient Market Hypothesis which is promoted by Eugene

Fama in 1970. Although it has been used in Theory of Random Walks and Rational Expectation Theory at the end 1950s and at the beginning 1960s.

Efficient Market Hypothesis explains if all available information in the market could indicates stock prices, so the market could be concluded efficient. According to Sen (2012) the implication of the efficient market if the stock price is independent and it volatiles following Random Walks of the available information either previous or today. The effect of Random Walks leads to investor cannot make Abnormal Return or make investment decision from available information. This is because all stock prices has been reflected all information and all investors have the same information. Research on the eficiency of Indonesian Capital Market is rarely done. Although reseach on factors affects composite stock price index (IHSG) has often been done using internal factors or external ones. Based on the facts, this research tries to explore if the Indonesian Capital Market is efficient or not, so that investors could use or not the available information for considering to make investment decision in the capital market.

2. LITERATURE REVIEW

The development of market efficiency theory has been discussed since the end of 1950s together with Random Walks Hypothesis (RWH) and Rational Expectation (RE). It develops into Efficient Market Hypothesis (EMH) becoming a topic that is discussed many scholars and practioners. The definition of eficient market can be grouped into (1) market definition based on stock price accurately. According to Sen (2012), market could be concluded eficient if stock price reflects all available and relevant information. An efficient market based on intrinsict value if price stock is not biased from its intrinsict value. The definition is weak because there is no clear limitation how much bias from stock price of its intrinsict value could be acceptable, (3). The market definition based on information distribution, notes that an efficient market if realized price after information received by market actors equal with the price which is occured if every one gets the information. This definition still has its weakness, because it needs a Benchmark to examine if the market efficient or not, and (4). Market definition based on dynamic process. Market is defined efficient if the price could reflect all available information full and fast, so that assymetric information turns to symectric.

Efficient market could be, if all information follows Random Walks pattern. Price is determined by the interaction between supply and demand. The information is available freely and it could be acessed by all market actors with the low cost. They will react in using information fast to gain new equilibrium. Based on the efficient market above to describe the development of stock price precisely by using Random Walks model. Campbel Random Walks model consists of 3 models which are, (1). Random Walks Model I, if the changing price is distributed independently and identically and it needs White Noise process very tidly (2). Random Walks Model II, if the changing price is only independent but it is not distributed and (3). Random Walks Model III, if the changing price is distributed identically and independently with White Noise process which is simple and easier. Triani (2013) describe in their research that Random Walks is used to detect if the stock price movement linear or not, so that EMH could be accepted. Sen (2012) noted that although researches on efficient market have been done which is found that stock price movement proved unlinear. This condition is enough fact to conclude efficient market.

Herve et al., (2011) used Run Test to find stock price index, NASDAQ, SSE Composite Index, KOSPI Composite Index, DOW JONES Brazil, BSE Sensex, FTSE 100, CAC 40, HANG SENG Index, and Straits Time Index. All statitically independent and it means that the capital market for the stock price index is efficient. Kewal (2012) did research on Indiannn Capital market during April 1, 2005 and March 31, 2010 with the research object S&P index, CNX Nifty, BSE, CNX 100, and S&PCNX 500 with the finding that stock price development in the Indiannn Capital market follows Random Walks pattern or it could be concluded that it is efficient. Dasgupta (2012) in his research finds that before liberalization, the Indonesian Capital Market, Thailand, Malaysia, Indiann, Korea, Philipina, and Taiwan are not efficient. However, since liberalization, Indonesian and Thailand Capital Market are efficient in the Weak Form Efficiency. It means that liberalization affects on investors in Indonesia and Thailand. They cannot use past information to predict today stock price. Hussin et al., (2012) on 20 firms which are included in KSE 100 index. The 20 firms in KSE 30 index during the period January 1, 1992 to April 30, 2013. They find commonly during 22 years KSE 100 index is not efficient. Consequently, investors can make Abnormal Return from the past information though in the last 4 years KSE 100 index indicates the capital market is efficient.

Other finding is the return of the firms in the composite KSE 30 index has Random Walks pattern compare with the return of the firms in the composite KSE 100 index. This fact indicates that the firms in the composite KSE 30 index is more efficient than those firms in KSE 100 index. Gan et al., (2006) examined RWH and EMH on 15 capital markets which are included in Emerging Market (Argentina, Brazil, Chile, Hong Kong, Indonesia, Israel,

Jordania, Korea, Malaysia, Mexico, Philipina, Singapura, Taiwan, Thailand, and Turkey) using nonparametric statistic test. They find that there is Random Walks pattern from stocks. Consequently, those capital markets in 15 countries could be concluded efficient.

Jeong et al., (2011) did research on the Istambul Capital market during January 1997-December 2011 using obsevation on the daily movement of XU030 index. He finds that the Istambul Captal Market does not follow Random Walks, so that investor can use information to make abnormal return. Other research on RWH and EMH using Artificial Neural Network (ANN), which finds that Bombay capital market does not follow RWH. Parkin (2014) finds only BSE 100 index, which is efficient in Indian capital market. His finding on BSE 100 index during 1998-2000 is not proved efficient. However during 2000-2001 they find that the BSE 100 index is efficient. Mun t al., (2008) also do research on Indian capital market during 2001-2006. They find an evidence of significant autocorelation in capital market return. Consequently, the return from Random Walks behavior is enough to refuse, so that all available information in the market could be used by investor to make abnormal return. During July-December 2007 on daily return BSE in Indiann capital market, that the return of the stocks can be predicted by using previous stock return pattern. The previous researches, which examine RWH and EMH, used more Run Test technic (Nonparametric Statistic) and Autocorrelation Test (Parametric Statistic). The conclusion of the Run Test and Autocorrelation Test, is that market could be defined as efficient or not, depends on wheather statistically test of Random Walks behavior is not found.

Sen (2012) noted that the examination of Run Test and Autocorrelation Test is only able to find evidence that there is predection from information linearly. However, it is able to find evidence that available information is distributed independently and identically as the assumption of EMH and RWH. Sirucek (2012) use BDS Test to examine if daily volatility index from 3 South Asian Countries is linear behavior and indipendent or not? The conclusion is the return from those countries are not distributed identicaly and independently. This conclusion is not fullfil the assumption of RWH, so that these capital markets are not efficient. Market Return. Market return is the result of investment activities, both in the realization form and the expectation (Hartono, 2007). Return measurement use several method such as, total return , relative return, cumulative return and adjusted return. The market return calculation in this research uses Sen approach (2012) and adjusted return to consider inflation effect. Nominal return market is counted by using the formula below:

$$RN_t = \ln(I_t) - \ln(I_{t-1}) \qquad (1)$$

Where:

RN_t is the market return on the period t, I_t is the closing IHSG on period t, I_{t-1} is the closing IHSG on the previous period t and t is period 1,2, …n

Adjusted market return is counted by using the formula as follow:

$$RPA_t = \frac{(1 + RN_t)}{(1 + INF_t)} - 1 \qquad (2)$$

Where:

RPA_t is adjusted market on the return period t, RN_t is the nominal market return in the period t, INF_t is the inflation rate in the period t.

According to Nofiatin (2013) foreign exchange is the currency value of one country or other country commodity (as gold or silver). But according to Parkin (2014) foreign exchange is the value of one country currency exchange to other country one in the foreign exchange market. The theories on foreign exchange (kurs) as, Interest Rate Parity Theory (IRPT), Purchasing Power Parity Theorem (PPPT), International Fisher Effect Theory (IFET) and International Parity Conditional (IPC) describe the changing of one country currency exchange value, caused by some factors such as, interest rate, purchasing power and society expectation on economic condition (Hadi, 2001). Stock market index in the capital market is mostly determined by foreign exchange, if stock ownership in the market is mostly dominated by foreign investor. Consequently, foreign currency appreciation will raise stock price index in the market or vice versa.

Several researches examine the relation between foreign exchange and stock price index as, Kewal (2012), Triani (2013), Haryogo (2013), Wongbangpo and Sharma (2012) find negative corelation for the case of Singapura and Thailand. On the other hand, the research of Kandir (2008), Gan, et al (2006), Nofiatin (2013), Dasgupta (2012), Jeong and Kim (2011) find positive corelation. The result is supported by Wongbangpo and Sharma (2002) for Indonesian, Malaysian and Filipina cases.

3. METHODOLOGY

This research uses population of all stock prices listed in Bursa Effek Iindonesia (BEI) which is reflected in the Composite Stock Price Index (IHSG) during January 1997 - December 2014 during 216-month observation. IHSG data are obtained from the publication in www.yahoofinance.com/, inflation from www.inflation.eu/, and foreign exchange from www.oanda.com/.

The variables used in this research include:

1. Adjusted Market Return (RNA) is the market return, which is counted using adjusted nominal return with the current inflation rate. Nominal Return (RN) is counted by using the movement of IHSG in BEI, which is measured based on the Closing Price during January 1997 to December 2014.

2. Inflation (INF) is the inflation rate during January 1997 to December 2014.

3. Rupiah exchange on USD is oneunit price of US Dollar in Rupiah by using medium price exchange during January 1997 to December 2014.

Data pattern must be known before doing data processing in order to gain optimal result and to intrepret it easier. The data pattern could be described with statistical descriptive such as mean, median, maximum, minimum value, deviation standard, Kurtosis and Skewness. Information from descriptive statistic can be used as a basic to determine if the data is distributed normally or not. The normality of data can be viewed from kurtosis value and skewness, if kurtosis value is 3 and skewness is 0, then the data is distributed normally (Mesokurtic). However, if kurtosis value is less than 3, the data have a flat peak (Platykurtic) and if kurtosis value is greater than 3, the data have a higher peak (Leptokurtic). The positive skewness value indicates the data distribution data skewer to the right (Median < Mean). On the other hand, if the negative data are distributed skewer to the left (Median > Mean). The examination on normality data statistically used Jarque-Bera Test with formula as follow:

$$JB = n\left[\frac{S^2}{6} + \frac{(K-3)^2}{24}\right] \qquad (3)$$

Where: JB is *Jarque-Bera value*, S is *Skewness* value, K is *Kurtosis* value and n is the sum of observation.

Model, designed in this research, is a model which is able to capture if there is an assymetrical information effect such as EGARCH and TARCH model. However, before forming the model, firstly, one must do several examinations as stasionerity data and ARCH Effect test.

Doing this test to detect if the data used, have *Unit Root* or not. The data which have unit root indicates the data are not stationer. In other word, the data are not random or vice versa. The data, which are not random, do not fullfil the condition of RWH, with the formula as follow :

$$y_t = \mu + y_{t-1} + \varepsilon_t \qquad \varepsilon_t \approx i.i.d\left(0, \sigma^2\right) \qquad (4)$$

Where: y_t is the data on period t, y_{t-1} is the data on the previous t, μ is constanta and ε_t is Error Term on period t.

Campblell, Lo and Mackinlay (1997) describe that random behavior data (RWH) if there is a mistake distribution independently or identically with the average zero and the variance is equal with σ^2.

RWH test is done by using Philip-Perron Unit Root Test (1988) based on the equation of Augmented Dickey-Fuller Test, by modification of coefficient t-ratio. Consequently, autocorelation does not have statistic test of asimtot distribution:

$$\Delta y_t = \alpha y_{t-1} + x_t \delta + \varepsilon_t \quad (5)$$

Modified t-ratio coeficient is counted by using the following formula:

$$\tilde{t}_\alpha = t_\alpha \left(\frac{\gamma_o}{f_o} \right)^{0,5} - \frac{T(f_o - \gamma_o) x (se(\tilde{\alpha}))}{2 f_o^{0,5} s} \quad (6)$$

Where:

$\hat{\alpha}$ is the estimate value, t_α is t-ratio coeficient, $se(\tilde{\alpha})$ is Standard Error coeficient, and s is Standard Error of regresion and γ_o is Error Variance coeficient from the equation (5) which is counted by using $(T-k)xs^2 / T$, k is the total regressor and f_o is the estimation of Residual Spectrum when the frequency is equal to zero. f_o estimator is counted by using the following formula:

$$\hat{f}_o = \sum_{j=-(T-1)}^{T-1} \tilde{\gamma}(j) x K\left(\frac{j}{l} \right) \quad (7)$$

Where:

l is bandwith parameter, K is kernel function and $\tilde{\gamma}(j)$ is autocovariance of residual $\hat{u}_t$ sample j which is formulated as follow:

$$\tilde{\gamma}(j) = \sum_{t=j+1}^{T} \frac{(\tilde{u}_t . \tilde{u}_{t-1})}{T} \quad (8)$$

Stationarity test of the data is used under the following hypothesis (Sodeyfi & Katircioglu, 2016):

H_o: Data have a Unit Root

H_a: Data have not a Unit Root

Null hypothesis has enough evidence to be accepted, if t-rasio smaller than MacKinnon critical value (1996) at the confidence level of 95 % or probability value (p-value) greater than that of 5 %. Thus, it could be meant that the data are not stationer or do not follow RWH pattern or vice versa.

ARCH Effect is caused by residual model which has inconsistency variance between some other time, so that it causes heteroskedastisity. The effect of this heteroskedasticity leads to the model become ineficient. This is because the variance is not minimum, so that it leads to positive bias (Overestimate) or negative atau bias (Underestimate). This research will test ARCH Effect based on the equotion AR (1) as follow:

$$y_t = \alpha + \beta y_{t-1} + \varepsilon_t \quad (9)$$

Where: y_t is market return on the period t and y_{t-1} is the market return on the previous period t.

ARCH Effect test is done by residual regresion square together with previous period with long Lag p as follow:

$$\varepsilon_t^2 = \beta_o + \left(\sum_{s=1}^{p} \beta_s \varepsilon_{t-s}^2\right) + v_t \qquad (10)$$

The hypothesis, which is used in *ARCH Effect* test, is:

H_0: there is *ARCH Effect*.

H_a: there is no *ARCH Effect*.

ARCH Effect is in a model, if F-statistic value from the equation (10) greater than F_{tabel} or caunted ChiSquare value (Obs*R-Square) greater than critical Chi-Square value (χ^2) at the level of 5 % using probability value (p-value) wich is smaller than that of 5 %, or vice versa.

Treshold Auto Regressive Conditional Heteroscedasticity (TARCH) is a model which is promoted by Zakoian (1990) and it is developed further by Glosten, Jaganathan and Runkley (1993) so that it is known as ehin GJR-GARCH. The equation of Conditional Mean from TARCH as follow :

$$Y_t = a_0 + \sum_{i=t}^{n} a_i X_t + \varepsilon_t \ (\textit{Conditional Mean}) \qquad (11)$$

The equation *Conditional Variancece* is written as follow:

$$\sigma_t^2 = \alpha_o + \sum_{t=1}^{n} \alpha_i \varepsilon_{t-i}^2 + \sum_{t=1}^{n} \beta_i \sigma_{t-i}^2 + \sum_{t=1}^{n} \gamma_i \varepsilon_{t-i}^2 d_{t-i} \ (\textit{Conditional Variancece}) \qquad (12)$$

Where:

d_{t-i} is *Dummy Variable* for ε_{t-i} (d_{t-i} =1, if $\varepsilon_{t-i} < 0$ and $d_{t-i} = 0$, if $\varepsilon_{t-i} > 0$), if $\varepsilon_{t-i} > 0$ indicates *Good News* and if $\varepsilon_{t-i} < 0$ indicates *Bad News*, and γ_i is *Leverage Effect*. The effect of good news is indicated by ARCH coeficient (α_i) and the effect of bad news is the sum of $\alpha_i + \gamma_i$, if $\gamma_i > 0$ there is *Leverage Effect* in the model which means the effect of bad news is greater and its character is volatility. On the other hand, when $\gamma_i \neq 0$ the effect of good news and bad news is assymetric. According to Piot-Lepetit (2011), total coeficient ($\alpha_i + \beta_j$) indicates volatility rate of the model. When $(\alpha_i + \beta_j) > 1$ indicates Explosive (Extreme) Volatility occurs, $(\alpha_i + \beta_j) < 1$ means Low Volatility occurs and $(\alpha_i + \beta_j) = 1$ means High Volatility.

BDS test is used to fulfill the asumption of Campble RWH, that residual of the model must be distributed indipendently and identically and to detect the linear pattern of the model. BDS Independent Test is promoted by Brock, et al (1996) with the formula as follow:

$$BDS = \left(\sqrt{n-m+1}\right)\frac{b_{m,n}(\varepsilon)}{\sigma_{m,n}(\varepsilon)} \rightarrow N(0,1) \qquad (13)$$

Where, $b_{m,n}(\varepsilon) = c_{m,n}(\varepsilon) - c_{1,n-m+1}(\varepsilon)^m$ and $c_{m,n}(\varepsilon) = \frac{2}{(n-m+1)(n-m)} \sum_{s=1}^{n-m+1} \sum_{t=s+1}^{n-m+1} \prod_{j=0}^{m-1} I_\varepsilon\left(X_{s+j}, X_{t+j}\right)$ I_ε is an indicator of the function:

$$I_\varepsilon(x,y) = \begin{cases} 1 & jika\ |x-y| \leq \varepsilon \\ 0 & jika\ |x-y| > \varepsilon \end{cases} \text{ but } \sigma_{m,n}^2(\varepsilon) = 4\left(k^m + 2\sum_{j=1}^{m-1} k^{m-j} c_1^{2j} + (m-1)^2 c_1^{2m} - m^2 k c_1^{2m-2}\right) \qquad (14)$$

Where:

m is a dimention, n is the frequency of observation, $c_{m,n}(\varepsilon)$ is integral corelation and $\sigma_{m,n}(\varepsilon)$ is *Standard Error* of $b_{m,n}(\varepsilon)$.

The hypothesis of *BDS Test* is :

H_0: Residual model is distributed indipendently and identically (i.i.d).

H_a: Residual model is not distributed indipendently and identically (i.i.d).

The decision of *BDS Test* is that $z_{statistic}$ value is greater than z_{tabel} or probability value is smaller than 5 %. It is enough reason to note that residual model is not distributed indipendently and identically (i.i.d), so that it could be noted that the model does not fullfil the asumption of RWH or vice versa.

4. RESULT AND DISCUSSION

Observation on the data, which are used in the research, is indicated on tabel 1, means that the distribution of data is not distributed normally. This is proved with JB (Jarque Bera) value which is very large or probability value which is lower than 5 %. Skewness value is greater than 0 with negative sign. It indicates the data accumulated on the low value which is its skewness to the left. Kurtosis value is greater than 3 indicates that there is heteroskedastisity phenomenon with Leptokurtic.

Table 1. Descriptive Statictic

Kriteria	RNA	KUSD
Mean	-0,30536	9.082,44000
Median	-0,35423	9.167,32600
Maximum	12,95713	14.243,87000
Minimum	-20,11458	2.368,78700
Standard Dev.	1,68125	1.888,02800
Skewness	-5,34716	-1,63806
Kurtosis	109,22880	7,95385
Jarque-Bera	101.640,00000	314,52330
Probability	0,00000	0,00000
Sum	-65,34793	1.943.642
Sum Sq. Dev.	602,06850	7,59E+08
Observations	216	216

IHSG movement during 1998-2014 (Figure 1) indicates the performance of BEI which is very fluctuative with the tendency increases.

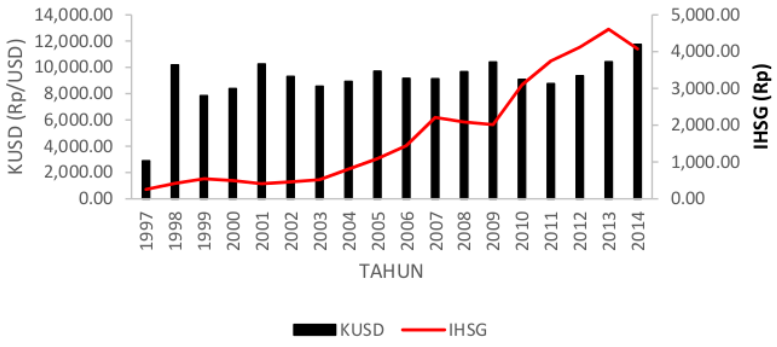

Figure 1.
Development of IHSG and Rupiah Currency Rate

Altough in the certain years IHSG has ever in the Bearish condition which is caused by global economic condition which is getting worse as Asian Economic Crisis 1998, US Subprime Mortgage Crisis 2008 and Greek bad debt 2010. The contraction of IHSG during 2013-2014 is more contributed by domestic political constelation. Exchange in Rupiah variable per USD during 1998-2014 tends more fluctuation compare with IHSG variable. The effect of financial crisis in 1998 forces exchange in Rupiah to USD weaken, but it is getting rebound by the end of 1999. At the beginning 2000 it is stressed again untill the end of 2001. So was it in 2005, it was depreciated by 8,65 % compare to that in the previous year. Rupiah depreciation was in the end of 2008-2009 because of Subprime Mortgage crisis. The changing of domestic political constelation before the election leads to Rupiah was stressed again at the beginning of 2012 untill the end of 2014. IHSG movement per month in 1998 appreciated from Rp 255,48 to Rp 418,47, but the adjusted market return, declined very significant caused by the increasing of inflation per month from 0,82% in 1997 to 4,96% in 1998. This condition also happened in 2004, 2005, and 2010, decreased by average 0,28; 0,36; and 0,29 each month with the increasing inflation average 0,52%; 1,34%; and 0,56% per month. Meanwhile the IHSG increases by average Rp 805,69; Rp 1.089,73; and Rp 3.095,13 per month.

The average of development of adjusted return per month during 1997-October 2014 as shown on Figure 2, indicates the volatility significant enough, but on the certain time it is opposite with the monthly average IHSG during 1997-October 2014 (Figure 2), as a result of inflation.

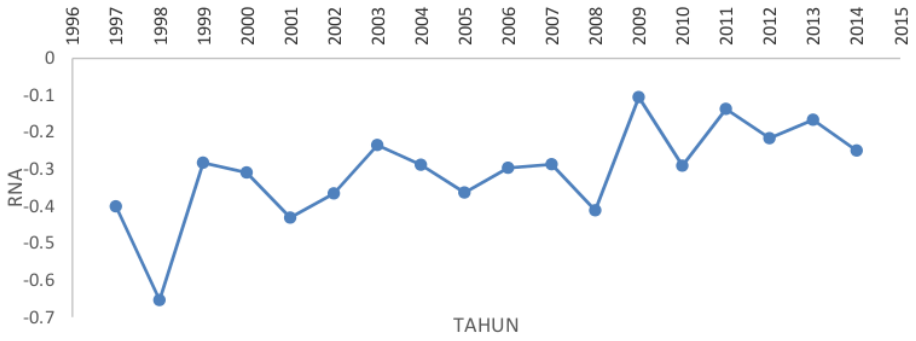

Figure 2.
Development of Adjusted Market Return (RNA)

This kind of capital market volatility is very interesting for investors to gain profit if only the capital market does not work efficiently. Consequently, the available information can be used to make decision to take abnormal return. However, if the market works efficiently, this condition cannot be used by investor in taking abnormal return. This is because the market price has indicated all the availabke information in the market and all investor has an equal ability to get the information.

The result of unit root test on research variables as shown on Table 2. It indicates all variables does not have unit root at the level unit of Phillips-Perron$_{statistic}$. They are 22,29480 (RNA) and -3,62570 (KUSD) which are greater than critical value at the significant level of 1%, 5% or 10 %. This means research variable is stasioner and it follows Random Walks.

Tabel 2. Stasionerity Test with Phillips-Perron Test

Variable		Phillips-Perron$_{Statistic}$	Probability
RNA		-22,29480	0,00000
Critical Value	1%	-2,57586	
	5%	-1,94232	
	10%	-1,61571	
KUSD		-3,62570	0,00600
Critical Value	1%	-3,46103	
	5%	-2,87493	
	10%	-2,57400	

The research result of *ARCH Effect* on the residual model is shown on table 3. There is no ARCH Effect or Volatility Clustering which means the model has constant residual model from time to time (Homoskedastisitas). This conditon is indicated by probability value of *ARCH Test* which is greater than 5 %.

Table 3. ARCH-LM Test Model ARMA (3,1) – TARCH (4,3)

$F_{Statistic}$	0,43184	Prob.F(3,204)	0,73040
$Obs*R_{Squared}$	1,31259	Pro.Chi-Square(3)	0,72610

TARCH modeling is needed to find if there is Leverage Effect and Asymmetric Effect in the model. Both effects will determine if all available information in the market are symmetric or not. If there is asymmetric information, then it could be concluded that the market dynamically is not efficient or vice versa. The result of TARCH modeling with using 3 Lags based on SIC (*Schwaz Information Criterian*) approach as shown on the Table 4:

Table 4. Estimasion Result ARMA (3,1) – TARCH (4,3)

Variable	Coefisient	Standard Error	$Z_{Statistic}$	Probability
Mean Condition				
C	-0,52575	0,10949	-4,80173	0,00000
KUSD	0,00003	0,00001	2,45410	0,01410
AR(1)	-0,18890	2,03922	-0,09263	0,92620
AR(2)	-0,17826	1,28886	-0,13831	0,89000
AR(3)	-0,18852	0,65873	-0,28619	0,77470
MA(1)	-0,18312	2,47494	-0,07399	0,94100
Variancece Condition				
C	1,45686	1,72751	0,84333	0,39900
$\varepsilon_{t-1}^2(\alpha_1)$	0,27273	5,72123	0,04837	0,96140
$\varepsilon_{t-1}^2(\alpha_2)$	0,18141	0,85850	0,21131	0,83260
$\varepsilon_{t-1}^2(\alpha_3)$	0,16774	6,89553	0,02433	0,98060
$\sigma_{t-1}^2(\beta_1)$	0,18714	0,77372	0,24188	0,80890
$\sigma_{t-1}^2(\beta_1)$	-0,12200	3,64492	-0,03347	0,97330
$\sigma_{t-1}^2(\beta_3)$	-0,23020	4,81922	-0,04777	0,96190
$\varepsilon_{t-}^2.d_{t-1} < 0(\gamma_1)$	-0,05184	5,35964	-0,00967	0,99230
$\varepsilon_{t-}^2.d_{t-1} < 0(\gamma_2)$	-0,19279	1,51781	-0,12702	0,89890
$\varepsilon_{t-}^2.d_{t-1} < 0(\gamma_3)$	-0,18099	7,74872	-0,02336	0,98140
$\varepsilon_{t-}^2.d_{t-1} < 0(\gamma_4)$	0,05083	0,34255	0,14839	0,88200

Table 4 indicates that adjusted market return is not determined by market return volatility and previous period variance and its changing which is indicated by none of the variables statistically significant. TARCH model in this research finds that there is Leverage Effect, which is Asymmetric Effect. This is indicated by the total leverage value which is not equal to zero. Other finding from this TARCH model, adjusted return volatility in the Indonesian Capital market during the research period has Low Volatility. This is because total ARCH (αi) effect with the effect of GARCH (βi) is smaller than one. The effect of bad news (αi +γi) on the adjusted market return volatility is smaller than that of good news (αi). It means that market gives more response if there is positive information but on the other hand, market has slower reaction if there is negative information.

One of the asumption which is based on RWH and EMH is the available information must be independence and identic distribution/IID. BDS test is needed to find if the Indonesian Capita Market has fullfiled of the assumption or not. Moreover, BDS Test is also used to prove if the relation between variables in the model is linear or non linear. BDS test uses the equation (13) with the dimension from 2 to 6 and the eupsilon (ε) value is 0,7 with the result as shown on Table 5:

Table 5. BDS Independence Test

Dimension	BDS Statistic	Standard Error	$Z_{Statistic}$	Probability
2	-0,00005	0,00064	-0,07067	0,94370
3	-0,00014	0,00142	-0,09573	0,92370
4	-0,00027	0,00236	-0,11553	0,90800
5	-0,00046	0,00343	-0,13280	0,89440
6	-0,00069	0,00462	-0,14852	0,88190

Based on the result on table 5, it could be concluded that the residual TARCH model, which is used in this research, is distributed independently and identically. Consequently, the assumption of RWH could be fullfilled. This is supported by the probability value of every dimension which is greater than 5 %, so that it is enough reason to accept null hypothesis of BDS Independence Test.

5. CONCLUSION

This study aims to investigate the efficiency of Indonesian stock market**.** This research finds that adjusted market return volatility return (RNA) at BEI is not determined by the volatility and RNA variance previous period. Although RNA is statistically significant determined by KUSD variables at the confindence level of 99 %. The test on the asumption of Random Walks on the adjusted market return variable return and foreign exchange and stasionery statistic at the significant level, RNA and KUSD variables fullfil the assumption of Random Walks Hypothesis. Leverage effect result proves that the Indonesian Capital Market contains some asymmetrical information, though it is not statistically significant. Based on the empirical findings, it proves that the Indonesian Capital Market fullfils the assumption of Efficient Market Hypothesis (EMH), so that investors cannot use the available information in the market as considering to take abnormal return. The implication of this finding may result the technical analysis, which is used as a benchmark to predict future market return becomes irrelevant and invalid.

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